U. S. WAR DEPT. TECHNICAL MANUAL 8-624

SINUSOIDAL MACHINE


THE ARMY MEDICAL LIBRARY, Washington, D.C.

TM8-624

WAR DEPARTMENT TECHNICAL MANUAL

SINUSOIDAL MACHINE

WAR DEPARTMENT • 1 SEPTEMBER 1944

WAR DEPARTMENT TECHNICAL MANUAL

TM8-624

SINUSOIDAL MACHINE

WAR DEPARTMENT • 1 SEPTEMBER 1944

United States Government Printing Office
Washington : 1944
For sale by the Superintendent of Documents, Washington, D. C.

WAR DEPARTMENT,
WASHINGTON 25, D. C., 1 September 1944.

TM 8–624, Sinusoidal Machine, is published for the information and guidance of all concerned.

[A. G. 300.7 (28 Jul 44).]

BY ORDER OF THE SECRETARY OF WAR:

G. C. MARSHALL,
Chief of Staff.

OFFICIAL:
J. A. ULIO,
Major General,
The Adjutant General.

DISTRIBUTION:

Armies (5); Corps (5); Sv C (10); Dept (10); ID 8 (2); IR 8 (2); T of Opn (10); Base Comd (10); Med Tech Sch (2); Med Dep (25) except St. Louis Dep (50).
ID 8: T/O 8–550.
IR 8: T/O 8–560.
For explanation of symbols, see FM 21–6.

CONTENTS

CHAPTER 1

INTRODUCTION

Section I. GENERAL

1. SCOPE. a. These instructions are published for the information and guidance of all personnel charged with the operation and maintenance of The McIntosh Electric Corporation Model No. 5018 of Sinusoidal Machine, Portable, for Galvanic, Faradic and Rapid Sinusoidal Currents, 110-Volt, 60-Cycle, Medical Department item No. 7132005 (fig. 1) in the field. They contain information on the operation and maintenance of the equipment with illustrations showing the various parts referred to in the instructions. They are arranged in three chapters: Chapter 1—Introduction; Chapter 2—Operating Instructions; Chapter 3—Maintenance Instructions.

b. A Standard Nomenclature List of parts for this item is included in appendix II.

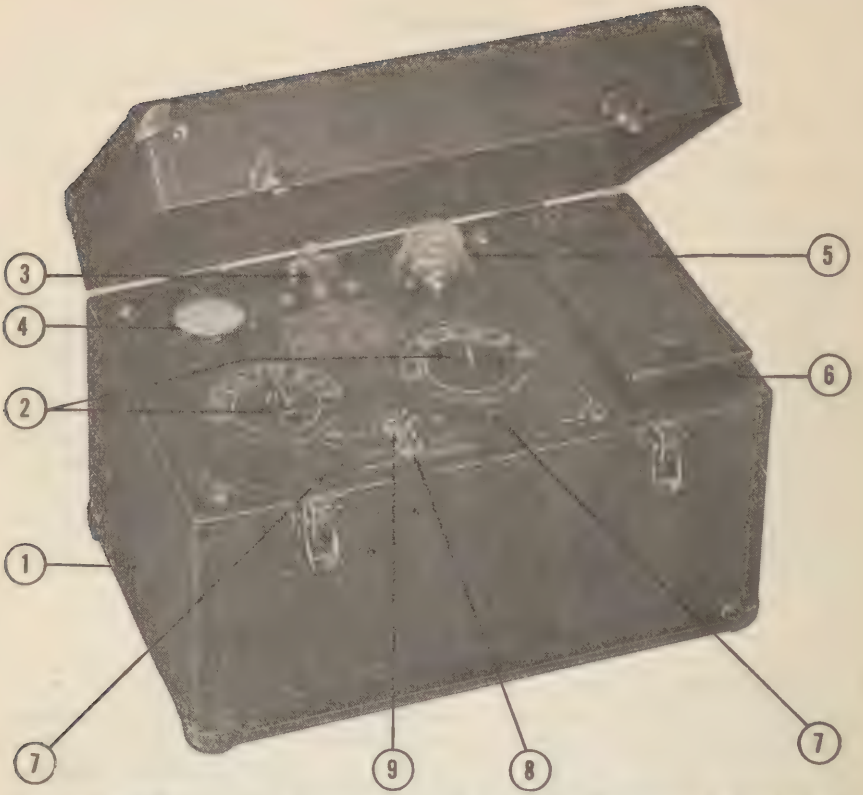
Section II. DESCRIPTION AND DATA

2. DESCRIPTION. The Sinusoidal Machine, Portable, is a light, self-contained unit completely inclosed in a carrying case. Necessary accessories are contained in a compartment in the lid of the carrying case. The apparatus delivers separately a galvanic, faradic, and rapid sinusoidal current, each of which is ground-free and suitable for therapeutic uses, particularly the testing of nerves and the testing and treating of muscles.

3. DATA. a. Performance. The Sinusoidal Machine, Portable, is designed to operate on 110-volt, 60-cycle, a-c or d-c current, depending on the available supply. A current selector switch is provided to make the necessary adjustment for operation on either type of current. At full load, the machine consumes a maximum of 6 amperes.

b. Manufacturers. The Sinusoidal Machine, Portable, is manufactured by McIntosh Electric Corporation, Chicago, Illinois, Model No. 5018.

Information relative to the type of equipment manufactured by the J. Beeber and Company will be incorporated in a change of the manual at a later date.



1. 7R03276 CASE, CARRYING, COMPLETE: Assembly; with hasps and handle.
2. 7R03236 HANDLE, INDICATOR, PLASTIC.
3. 7R03212 VIBRATOR,COMPLETE: Assembly.
4. 7R03206 MILLIAMPERMETER.
5. 7R03202 TUBE, RECTIFIER.
6. * ACCESSORY COMPARTMENT.
7. 7R03240 POST, BENDING, COMPLETE: Assembly; for patient's cord.
8. 7R03242 SWITCH, POLARITY, COMPLETE: Assembly.
9. 7R03244 SWITCH, METER SCALE SELECTOR, COMPLETE: Assembly.

* No spare part number. (Component part of 7R03276, CASE, CARRYING, COMPLETE.)

Figure 1. Portable Sinusoidal Machine, manufactured by the McIntosh Electric Corporation.

CHAPTER 2

OPERATING INSTRUCTIONS

Section I. GENERAL

4. SCOPE. This chapter contains information for the guidance of the personnel responsible for the operation of this equipment. It contains information on the operation of the equipment with the description and location of the controls and instruments.

Section II. SERVICE UPON RECEIPT OF EQUIPMENT

5. UNPACKING. To unpack the sinusoidal machine, open the shipping box carefully. Remove packing materials. Grasp the handle of the carrying case and lift the apparatus from the shipping box.

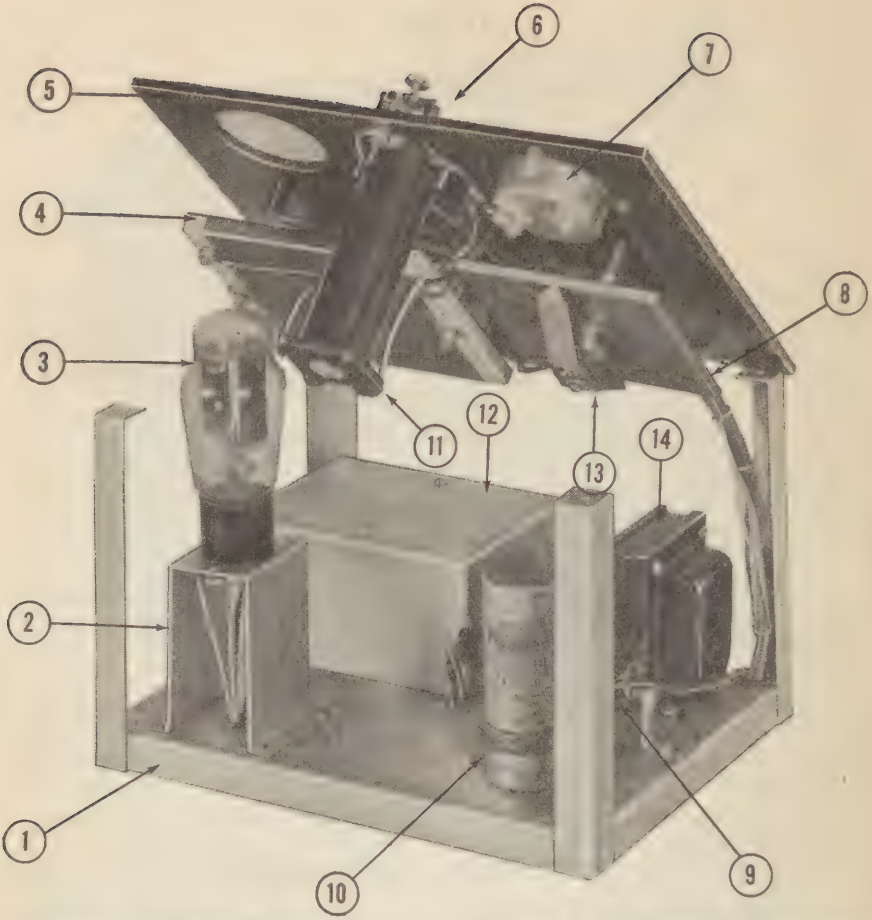
6. ASSEMBLING. The apparatus is shipped completely assembled except for inserting the male plug, SR00026 (fig. 3), of the line cord into the power supply receptacle and the female receptacle, SR00025 (fig. 3), of the line cord into the recessed plug at the back of the carrying case. The patient cables must be removed from the compartment in the carrying case lid and attached to the apparatus by inserting the patient's cord tips into the binding posts, 7R03240 (fig. 1). The machine is then ready to have the electrodes applied. The application of the electrodes is described in Section IV.

Section III. CONTROLS AND INSTRUMENTS

7. CONTROLS. a. Polarity switch. The polarity switch, 7R03242 (fig. 1), is located between the binding posts, 7R03240 (fig. 1), at the front of the control panel, 7R03264 (figs. 1 and 2). It determines the polarity of the electrodes used. When operating on alternating current, the polarity switch should always point toward the positive electrode binding post.

b. Meter scale switch. The meter scale switch, 7R03244 (fig. 1), permits the selection of the scale desired on the milliampermeter, 7R03206 (figs. 1 and 2). When a galvanic current of less than 12 milliamperes is required, snap the meter scale switch to the "Low" position and read the current on the 0 to 12 scale of the milliammeter. When a galvanic current of more than 12 milliamperes is required, snap the meter scale switch to "High" and read current on the 0 to 120 scale.

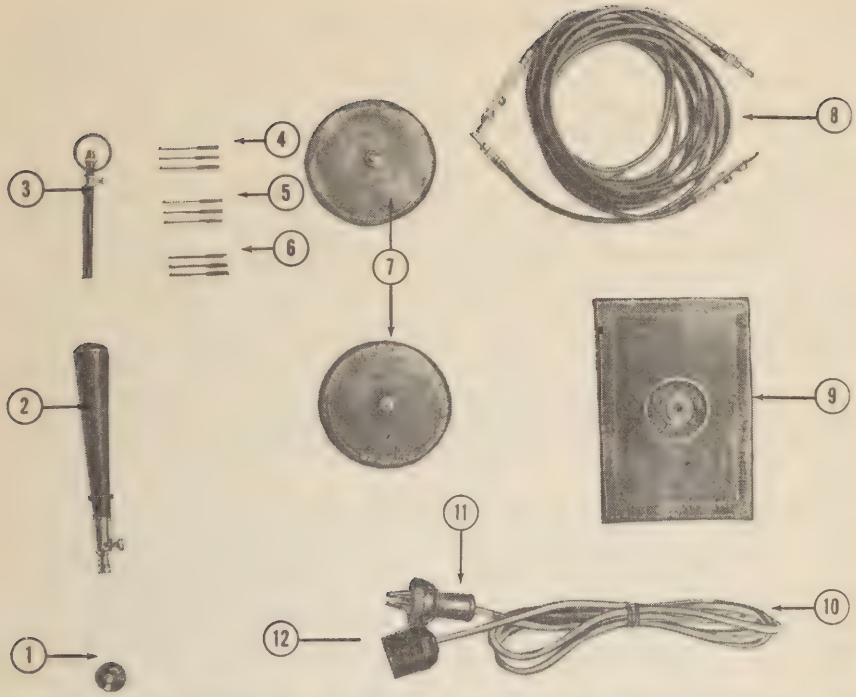
c. Current selector switch. The current selector switch is used to select which of the three available wave forms will be used on alternating current and on direct current. Before connecting the machine to the supply line, determine whether the supply current is alternating or direct. Turn the selector switch control handle, 7R03236 (fig. 1), to the "a-c" or "d-c" side and insert the stop pin used in conjunction with the switch. This prevents turning switch to the wrong side and thus safeguards the unit against possible damage. On the alternating current side of the selector switch,



1. 7R03266 BASE, MOUNTING, METAL.
2. * TUBE MOUNT.
3. 7R03202 TUBE, RECTIFIER.
4. 7R03262 CONTROL, PATIENT CURRENT, COMPLETE: Assembly.
5. 7R03264 PANEL, TOP, PLASTIC.
6. 7R03212 VIBRATOR, COMPLETE: Assembly.
7. 7R03206 MILLIAMPERMETER.
8. 7R03260 BOARD, MODALITY SELECTOR SWITCH, COMPLETE: Assembly.
9. 7R03256 RESISTOR, 150 OHM.
10. 7R03204 CAPACITOR, ELECTROLYTIC.
11. 7R03248 COIL, FARADIC.
12. 7R03272 TRANSFORMER, LINE.
13. 7R03246 BLADE, MODALITY SELECTOR, COMPLETE: Assembly.
14. 7R03258 COIL, CHOKE.

* No spare part number. (Component part of 7R03266, BASE, MOUNTING METAL.)

Figure 2. Sinusoidal Machine, manufactured by McIntosh Electric Corporation inside view.



1. SR00025 PLUG, FEMALE, TWO PRONG G. E GC-3C3.
2. SR00026 PLUG, MALE, SMALL, TWO PRONG.
3. SR00072 CORD, NEOPRENE, NO. 18, TWO CONDUCTOR.
4. 7R03214 CORD, PATIENT'S, COMPLETE: Assembly.
5. 7R03220 HANDLE, WOODEN, COMPLETE: Assembly.
6. 7R03218 ELECTRODE, 7/8 INCH DISC, NICKEL PLATED.
7. 7R03224 ELECTRODE, ASBESTOS PAD, 4 X 6 INCHES.
8. 7R03226 ELECTRODE, SPONGIO PAD, 3½ INCH.
9. 7R03228 HOLDER, NEEDLE, COMPLETE: Assembly; with magnifying glass.
10. 7R03230 ELECTRODE, NEEDLE, BULBOUS, FINE.
11. 7R03232 ELECTRODE, NEEDLE, BULBOUS, MEDIUM.
12. 7R03234 ELECTRODE, NEEDLE, BULBOUS, COARSE.

Figure 3. Accessories, Sinusoidal Machine, manufactured by McIntosh Electric Corporation.

three wave forms are available: galvanic, secondary faradic, and rapid sinusoidal. On the direct current side of the selector switch, three wave forms are also available: galvanic, secondary faradic, and primary faradic. Never attempt to use the current forms listed under alternating current when the machine is operating on direct current. This will injure the electrical circuit of the apparatus.

d. Patient current control. The patient current control, 7R03262 (figs. 1 and 2), increases or decreases the milliampere output of the apparatus. It is calibrated on an arbitrary scale from "Off" on the left to "180" on the right. It is a convenient control panel method of regulating patient dosage of all the current forms.

e. Vibrator screw. The vibrator screw, 7R03212 (figs. 1 and 2), is located at the back of the control panel. From time to time it may need adjustment as continued use of the apparatus oxidizes and wears down the contact points. To adjust these points, turn the vibrator screw so its tungsten contact just touches the tungsten contact of the spring.

8. INSTRUMENTS. a. Milliampermeter. A direct current milliampermeter, 7R03206 (figs. 1 and 2), is located at the left rear of the control panel. It operates only when galvanic current is used. This meter is provided with two scales, a low scale calibrated from "0" to "12" milliamperes and a high scale calibrated from "0" to "120" milliamperes. The position of the meter scale switch determines which scale on the milliampermeter shall be read. This procedure is discussed thoroughly in paragraph 7b.

b. Rectifier tube. The rectifier tube, 7R03202 (figs. 1 and 2), must be installed when the equipment is used on alternating current. It should be inserted on its socket through the hole at the right rear of the control panel. The tube will fit only one way in the socket with the heavy prongs toward the rear of the machine. It is essential that the tube be pushed down tightly to obtain proper contact.

Section IV. OPERATION

9. OPERATION. a. To determine polarity when operating on direct current. (1) Set current selector switch on "Galvanic from line," which is No. 1 on the d-c side of the current selector switch.

(2) Set meter scale switch, 7R03244 (fig. 1), to "High" position.

(3) Set patient current control, 7R03262 (figs. 1 and 2), to "Off" position.

(4) Turn patient current control very slowly to right and note the direction the meter indicator points. If the indicator points toward the right, the polarity is correct. If the indicator pointer moves toward the left of the "0" mark, the polarity is wrong. Correct the polarity by reversing the male plug in the current supply socket.

(5) Recheck polarity by repeating the procedure outlined above.

b. Preparation of electrode pads. (1) Soak pads to be used in a hot saline solution or hot water for about 10 minutes.

(2) Squeeze excess solution or water out of pads on a towel laid flat on the table.

c. To prepare needle electrodes for operation. (1) Open the chuck of the needle holder with magnifying glass, 7R03228 (fig. 3), by turning clockwise when holding the needle holder in operating position.

(2) Push the needle electrode selected through the back of the chuck until the needle protrudes about ½ inch from the chuck.

(3) Tighten the chuck.

(4) Connect the needle holder with the needle inserted to the negative or black cord.

d. Connecting of patient's cords, 7RO3214 (fig. 3). (1) The patient's cords should be connected so that the red cord is in the positive binding post, 7R03240 (fig. 1).

(2) The black cord should be connected in the negative binding post, 7R03240 (fig. 1).

(3) The polarity of the binding posts is determined by the polarity switch, 7R03242 (fig. 1), which points in the direction of the positive binding post.

e. To determine wave form. To determine wave form, turn indicator, 7R03236 (fig. 1), on current selector switch to position 1, 2, or 3, depending on the wave form desired. Patient current control must always be at "Off" during this operation.

f. To control patient's dosage. (1) To increase dosage, turn patient current control indicator, 7R03236 (fig. 1), to right.

(2) To decrease dosage, turn patient current control to left.

(3) Milliamperes being delivered by the machine are registered on D. C. Milliampermeter, 7R03206 (figs. 1 and 2), when galvanic current is being delivered. When the other wave forms are being delivered, the meter will not register.

g. Use of wave forms. (1) Galvanic current is used for nerve testing or destructive action on hair or tissue.

(2) Faradic current is used for testing nerves and testing and treating muscles.

(3) Rapid sinusoidal current is used mainly for inhibition of the sciatic nerve in sciatica. This wave form is available on the alternating current side only.

CHAPTER 3

MAINTENANCE INSTRUCTIONS

Section I. GENERAL

10. SCOPE. This chapter contains information for first echelon maintenance of the portable sinusoidal machine.

Section II. PREVENTIVE MAINTENANCE SERVICES

11. DUSTING. Keep the machine clean and free of dust by frequently dusting with a damp cloth.

12. ELECTRICAL CONNECTIONS. Keep all connections on line cord and patient's cords, 7R03214 (fig. 3), bright and clean by occasional sanding with a fine grade of emery cloth and wiping with a clean rag.

Section III. TROUBLE SHOOTING

13. MILLIAMPERMETER BURNED OUT. No galvanic current will come through if the milliampermeter is burned out, as the milliampermeter is connected in series in the circuit. The meter should be replaced. If a replacement meter is not available, short the meter out by putting a wire across the meter binding posts, 7R03240 (fig. 1).

14. TESTING PATIENT'S CORDS. To test the patient's cords, 7R03214 (fig. 3), set the current or modality selector switch to "Galv." and test each cord separately by inserting the cord tip and turning the current control to secure a given milliampere reading. Grasp the cord near the cord tip and shake it, observing the meter indicator needle. If the needle moves, there is a broken wire connection. The wire should be cut off above the broken connection and again attached to the cord tip.

15. TESTING ELECTRODE PADS. To test the electrode pads, insert the patient's cords, 7R03214 (fig. 3), and short circuit them so that the current passes from one binding post, 7R03240 (fig. 1), to the other directly through both cords. With the meter set on "High" scale, turn the current or power control until the meter registers 80 milliamperes. After the pads have been soaked thoroughly for at least 10 minutes in a saturated saline solution, attach to the patient's cords, placing the canvas sides of the pads together and leaving the current controller in the same position as before. There should not be a drop of more than 20 milliamperes in the meter reading. If the current drops to less than 60 milliamperes, the pads should be replaced.

16. RECTIFIER TUBE. In operation, the rectifier tube, 7R03202 (figs. 1 and 2), lights up. Excessive heating of the tube shows that the electrolytic capacitor is defective or burned out. The capacitor can be removed by

pulling it from its socket. When not in use, the tube should be removed from the socket and carefully replaced in accessory compartment.

17. VIBRATOR SCREW. The vibrator screw, 7R03212 (figs. 1 and 2), may need adjusting so that its tungsten contact just touches the tungsten contact of the spring, as continued use will oxidize and wear down these points. If the faradic current fails to come through after adjusting the vibrator screw, the faradic coil may be burned out.

18. CHOKE COIL. To test the choke coil, 7R03258 (fig. 2), connect a lamp in series across the terminals. If the coil is all right, the lamp will light up weakly. If the lamp is bright, the choke coil is shorted.

19. LINE TRANSFORMER RHEOSTAT. The line transformer rheostat may be tested with any standard a-c voltmeter. The 125 OHM resistor should be tested with an ohmmeter.

APPENDIX I

SHIPMENT AND STORAGE

The Sinusoidal Machine, Portable, is a light, self-contained unit completely inclosed in a carrying case. It requires additional protection, however, for shipment and storage.

1. Disassembling. To disassemble the machine for packing, remove the patient's cables from the receptacles in the control panel. Remove the line cord from the power source and from the receptacle in the back of the carrying case. Pack the line cord patient's cables and electrodes in the lid of the carrying case.

2. Packing. To pack the sinusoidal machine, place it in a wooden or stout kraftboard box. Pad well with paper or rags to prevent shifting in transit.

3. Storage. No special instructions are necessary for storage. However, the sinusoidal machine is a delicate electrical instrument, subject to damage from sharp jolts, jarring, or dropping, and it must be handled with care.

APPENDIX II

STANDARD NOMENCLATURE LIST OF PARTS

(McIntosh Electric Corporation Model No. 5018)

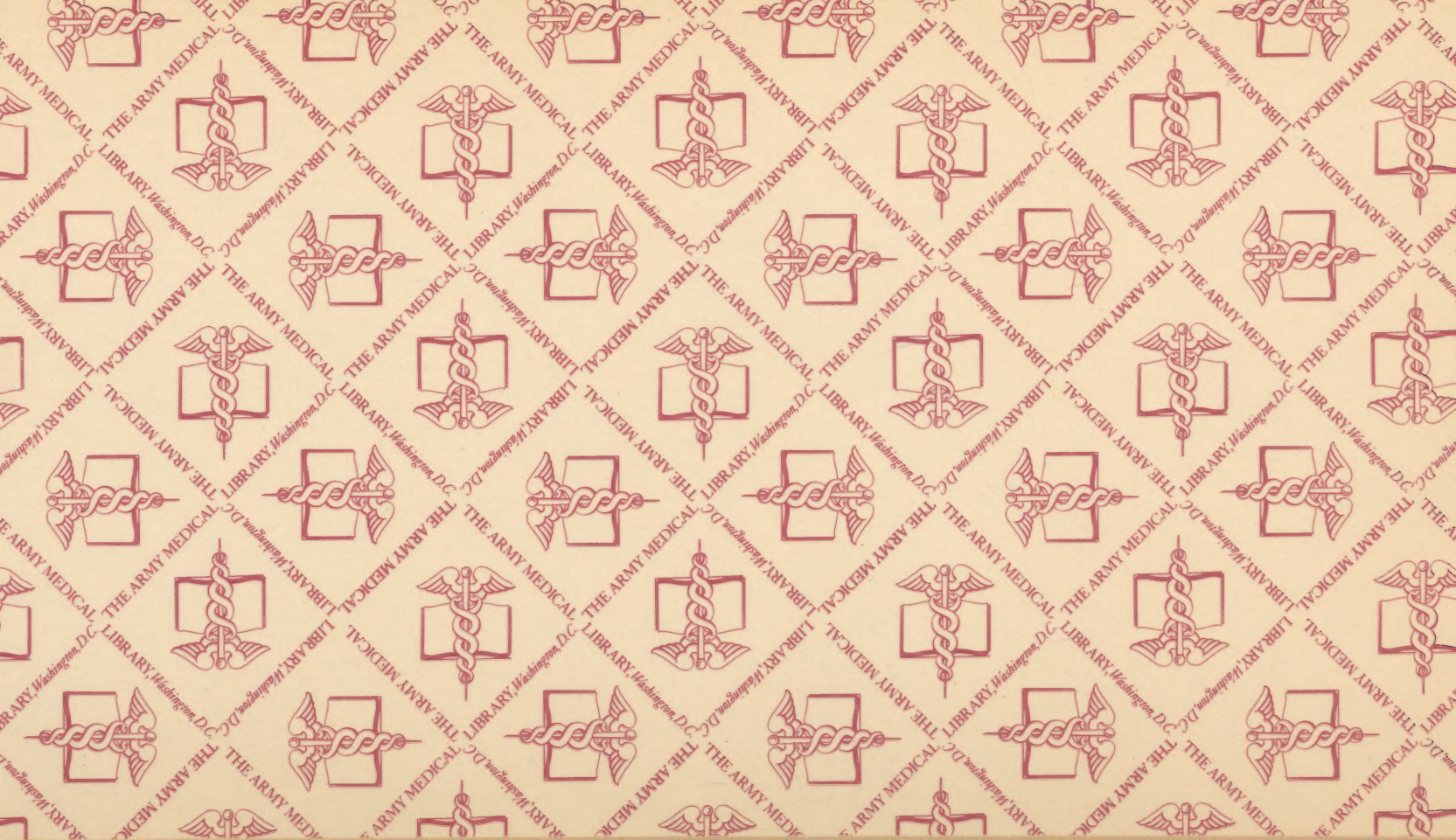
Common parts

	Fig. No.	Med. Dept. No.	Nomenclature
	—	SR00003	SCREW, 8–32 X 1/2 INCH, R. H. M. Used to secure transformer cover.
*	3	SR00025	PLUG, FEMALE, TWO PRONG, G. E. GC–3C3.
*	3	SR00026	PLUG, MALE, SMALL, TWO PRONG.
	—	SR00042	WASHER, SCREW SIZE 6.
	—	SR00043	NUT, 6 X 32, HEX.
*	—	SR00047	SCREW, 4–36 X 3/8 INCH, R. H. M.
*	3	SR00072	CORD, NEOPRENE, NO. 18, TWO CONDUCTOR.
	—	SR00105	SCREW, 6–32 X 3/8 INCH, R. H. M.
*	—	SR00108	SCREW, 6–32 X 3/4 INCH, R. H. M. Used in vibrator.
	—	SR00142	SCREW, 10–32 X 3/4 INCH, R. H. M. Used to secure mounting base to carrying case.
	—	SR00151	WASHER, LOCK, SCREW SIZE 10. Used in mounting.
*	—	SR00152	WASHER, LOCK, SCREW SIZE 8.
	—	SR00153	WASHER, LOCK, SCREW SIZE 6.
	—	SR00158	WASHER, SHAKEPROOF, SCREW SIZE 6, INT. Used in vibrator assembly.
	—	SR00229	WASHER, LOCK, SCREW SIZE 1/4. Used in transformer mounting.
	—	SR00230	NUT, 1/4 X 20, HEX. Used in transformer mounting.
*	—	SR00269	NUT, 4 X 36, HEX. Used to secure milliammeter.
	—	SR00293	WASHER, SCREW SIZE 1/4. Used in mounting base.
	—	SR00304	WASHER, SCREW SIZE 8.
	—	SR00330	NUT, 10 X 32, HEX. Used in mounting base.
*	—	SR00399	NUT, CAP, 6 X 32, HEX. Used in vibrator assembly.
*	—	SR00402	SCREW, 4–36 X 3/8 INCH, FL. H. M. Used in vibrator assembly.
	—	SR00412	PIN, COTTER, 3/32 INCH DIA., 1/2 INCH LENGTH. Used in control shafts.
	—	SR00427	BRACKET, RESISTOR, OHMITE NO. 12.
	—	SR00431	WASHER, FINISHING, SCREW SIZE 8, COUNTERSUNK. Used in mounting top panel.
*	—	SR00432	SCREW, 5 X 1/2 INCH, R. H. WOOD. Used to secure power supply receptacle.
	—	SR00433	SCREW, 8–32 X 5/8 INCH, O. H. M. Used to secure top panel.
	—	SR00434	SCREW, 1/4–20 X 3 INCH, R. H. M. Used to secure transformer.
	—	SR00435	NUT, 1/4 X 20, SQUARE. Used to secure transformer.
	—	SR00436	SCREW, 6–32 X 5/8 INCH, R. H. M. Used in condenser.
	—	SR00437	SCREW, 10 X 1 3/4 INCH, R. H. WOOD.
*	—	SR00572	SETSCREW, 8–32 X 3/8 INCH, HEADLESS CUP POINT. Used in indicator handles.

	Fig. No.	Med. Dept. No.	Nomenclature
*	1–2	7R03202	TUBE, RECTIFIER.
*	2	7R03204	CAPACITOR, ELECTROLYTIC.
*	1–2	7R03206	MILLIAMPERMETER.
*	—	7R03208	CONDENSER, PAPER WOUND.
*	1–2	7R03212	VIBRATOR, COMPLETE: Assembly; includes screw, spring, and yoke.
*	3	7R03214	CORD, PATIENT'S, COMPLETE: Assembly.
*	3	7R03216	ELECTRODE, ASBESTOS PAD, 4 X 6 INCHES.
*	3	7R03218	ELECTRODE, ⅞ INCH DISC, NICKEL PLATED.
*	3	7R03220	HANDLE, WOODEN, COMPLETE: Assembly.
*	3	7R03226	ELECTRODE, SPONGIO PAD, 3½ INCH.
*	3	7R03228	HOLDER, NEEDLE, COMPLETE: Assembly with magnifying glass.
*	3	7R03230	ELECTRODE, NEEDLE, BULBOUS, FINE.
*	3	7R03232	ELECTRODE, NEEDLE, BULBOUS, MEDIUM.
*	3	7R03234	ELECTRODE, NEEDLE, BULBOUS, COARSE.
*	1	7R03236	HANDLE, INDICATOR, PLASTIC.
*	—	7R03238	PIN, STOP.
	1	7R03240	POST, BINDING, COMPLETE: Assembly for patient's cord.
	1	7R03242	SWITCH, POLARITY, COMPLETE: Assembly.
	1	7R03244	SWITCH, METER SCALE SELECTOR, COMPLETE: Assembly.
	2	7R03246	BLADE, MODALITY SELECTOR, COMPLETE: Assembly.
	2	7R03248	COIL, FARADIC.
	—	7R03250	NUT, 6–32 X 5/16 INCH, HEX. Used in vibrator assembly.
	—	7R03252	NUT, 4–36 X ½ INCH, HEX. Used in vibrator assembly.
	—	7R03254	RECEPTACLE, RECESSED, MALE, TWO PRONG. For power supply.
	2	7R03256	RESISTOR, 150 OHM.
	2	7R03258	COIL, CHOKE.
	2	7R03260	BOARD, MODALITY SELECTOR SWITCH, COMPLETE. Assembly.
	1–2	7R03262	CONTROL, PATIENT CURRENT, COMPLETE: Assembly.
	1–2	7R03264	PANEL, TOP, PLASTIC.
	2	7R03266	BASE, MOUNTING, METAL.
	—	7R03268	COVER, TRANSFORMER, METAL.
	—	7R03270	BOARD, TERMINAL, TRANSFORMER, COMPLETE: Assembly.
	2	7R03272	TRANSFORMER, LINE.
	—	7R03274	CLAMP, PAPER WOUND CONDENSER.
	1	7R03276	CASE, CARRYING, COMPLETE: Assembly; with hasps and handle.

* To be requisitioned, when required, from the supply depot.
No asterisk indicates that the item is not stocked as a spare part, but can be obtained by special requisition.

★ U. S. GOVERNMENT PRINTING OFFICE: 1944—604443


THE ARMY MEDICAL LIBRARY, Washington, D.C.